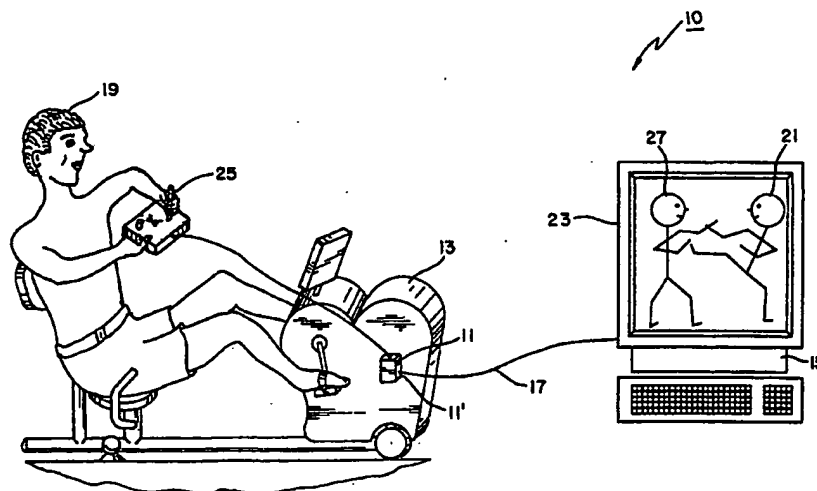




INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification ⁶: G09B 21/00	A1	(11) International Publication Number: WO 99/00782 (43) International Publication Date: 7 January 1999 (07.01.99)
(21) International Application Number: PCT/US98/13122 (22) International Filing Date: 26 June 1998 (26.06.98) (30) Priority Data: 60/051,074 27 June 1997 (27.06.97) US Not furnished 25 June 1998 (25.06.98) US (71)(72) Applicant and Inventor: DUGAN, Brian, M. [US/US]; 18 John Street, Tarrytown, NY 10591 (US).		(81) Designated States: JP, European patent (AT, BE, CH, CY, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE). Published <i>With international search report.</i>

(54) Title: SYSTEM AND METHOD FOR IMPROVING FITNESS EQUIPMENT AND EXERCISE

**(57) Abstract**

A method and apparatus for exercise equipment (13) and exercise is provided. One or more exercise monitors (11) are attached to a piece of exercise equipment, and/or an exerciser. During exercise each exercise monitor measures a performance level of the exerciser, and outputs a performance level signal to a video game player. The video game player monitors the performance level of a video game character based on the performance level of the exerciser. Many exerciser performance levels may be monitored, such as pulse rate, exercise rate, distance traveled, time exercised, etc., and can be used to control such video game character performance levels as speed, striking force, energy level, lifetime, game level, etc. The video game player preferably comprises a handheld video game player (25).

FOR THE PURPOSES OF INFORMATION ONLY

Codes used to identify States party to the PCT on the front pages of pamphlets publishing international applications under the PCT.

AL	Albania	ES	Spain	LS	Lesotho	SI	Slovenia
AM	Armenia	FI	Finland	LT	Lithuania	SK	Slovakia
AT	Austria	FR	France	LU	Luxembourg	SN	Senegal
AU	Australia	GA	Gabon	LV	Latvia	SZ	Swaziland
AZ	Azerbaijan	GB	United Kingdom	MC	Monaco	TD	Chad
BA	Bosnia and Herzegovina	GE	Georgia	MD	Republic of Moldova	TG	Togo
BB	Barbados	GH	Ghana	MG	Madagascar	TJ	Tajikistan
BE	Belgium	GN	Guinea	MK	The former Yugoslav Republic of Macedonia	TM	Turkmenistan
BF	Burkina Faso	GR	Greece	ML	Mali	TR	Turkey
BG	Bulgaria	HU	Hungary	MN	Mongolia	TT	Trinidad and Tobago
BJ	Benin	IE	Ireland	MR	Mauritania	UA	Ukraine
BR	Brazil	IL	Israel	MW	Malawi	UG	Uganda
BY	Belarus	IS	Iceland	MX	Mexico	US	United States of America
CA	Canada	IT	Italy	NE	Niger	UZ	Uzbekistan
CF	Central African Republic	JP	Japan	NL	Netherlands	VN	Viet Nam
CG	Congo	KE	Kenya	NO	Norway	YU	Yugoslavia
CH	Switzerland	KG	Kyrgyzstan	NZ	New Zealand	ZW	Zimbabwe
CI	Côte d'Ivoire	KP	Democratic People's Republic of Korea	PL	Poland		
CM	Cameroon	KR	Republic of Korea	PT	Portugal		
CN	China	KZ	Kazakhstan	RO	Romania		
CU	Cuba	LC	Saint Lucia	RU	Russian Federation		
CZ	Czech Republic	LI	Liechtenstein	SD	Sudan		
DE	Germany	LK	Sri Lanka	SE	Sweden		
DK	Denmark	LR	Liberia	SG	Singapore		
EE	Estonia						

SYSTEM AND METHOD FOR IMPROVING
FITNESS EQUIPMENT AND EXERCISE

5 This application claims priority from United States provisional application Serial No. 60/051,074, filed June 27, 1997.

FIELD OF THE INVENTION

10 The present invention relates to exercise equipment and fitness activities, and more particularly to a system and method for improving fitness equipment and exercise.

15 BACKGROUND OF THE INVENTION

 A fitness craze has recently swept the United States and many other countries. From fat-free potato chips to treadmills, people around the world have become obsessed with weight loss and healthy living. Accordingly, record
20 numbers of new fitness products/exercise equipment have emerged to meet this obsession (including stair climbers, treadmills, recumbent bicycles, ski machines, and the like).

 Many pieces of exercise equipment, when used regularly, are very useful for weight loss, for improving
25 cardiovascular stamina, and for strengthening various muscles. However, most exercise equipment suffers from a major drawback: the equipment is boring to use because of its inability to successfully encourage a user (e.g., an exerciser) to continue exercising. As a result, most
30 purchasers of exercise equipment stop using the equipment shortly after purchasing it.

 A need therefore exists for a system and a method for making both existing and new exercise equipment more enjoyable by successfully stimulating and encouraging an
35 exerciser to continue exercising. Such a system and a

method will significantly improve both existing and new exercise equipment, as well as exercise itself (e.g., by making it more enjoyable).

5 It is therefore an object of the present invention to provide a system and a method for making existing or new exercise equipment more stimulating to an exerciser, thereby improving exercise.

SUMMARY OF THE INVENTION

10 These and other objects of the invention are accomplished in accordance with the principles of the invention by providing a system and a method for improving both new and existing exercise equipment and exercise.

Exercise equipment and/or exercise is modified by
15 placing an exercise monitor (e.g., a pulse monitor, a distance meter, a rate monitor, a time monitor, a calorie meter, a strain gauge, an accelerometer and/or any other sensor for measuring the physical activity/performance level of an exerciser) on the equipment and/or the exerciser. The
20 exercise monitor outputs a signal representative of the performance level of an exerciser using the exercise equipment (e.g., pulse rate, distance traveled, time exercised, rate of exercise, etc.). The performance level signal then is fed to a video game player wirelessly or via
25 a cable. The video game player may be a desk-top computer, or preferably comprises a hand-held video game player such as a GameBoy™ marketed by Nintendo.

To stimulate the exerciser, the output from the exercise monitor is used by the video game player in an
30 interactive fashion. For example, the output from the exercise monitor may be used to control a parameter within a video game that runs on the video game player, such as a video game character's performance level (e.g., lifetime, energy level, striking force, accuracy, speed or the like).
35 Similarly, a video game character may be precluded from

reaching a higher level in a game unless the exerciser pedals fast enough, runs far enough, exercises long enough, has a high (or low) enough pulse rate or reaches some other performance level. Multiple performance levels of an exerciser may be monitored and used to control multiple performance levels of a video game character (e.g., pulse rate of the exerciser dictates energy level or lifetime of a video game character, exercise rate controls the speed of or the striking force of the video character, and length of exercise controls game level).

Other objects, features and advantages of the present invention will become more fully apparent from the following detailed description of the preferred embodiments, the appended claims and the accompanying drawings.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic view of an exercise system for exercising in accordance with a first embodiment of the present invention; and

FIG. 2 is a schematic view of an exercise system for exercising in accordance with a second embodiment of the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

FIG. 1 is a schematic view of an exercise system configured in accordance with a first embodiment of the present invention. With reference to FIG. 1, the exercise system 10 comprises an exercise monitor 11 connected to a recumbent bicycle 13, and a computer 15 coupled to an output 11' of the exercise monitor 11 via a cable 17. Any other piece of exercise equipment may be similarly employed (e.g., a stair climber, a stationary bicycle, a rowing machine, etc.).

The exercise monitor 11 is configured to measure the pedal rate of an exerciser 19 riding the recumbent

bicycle 13, and to output an approximately real-time measure of pedal rate via the output 11'. Other or additional exerciser performance levels (e.g., a measure of the length, intensity or some other characteristic of the exercise activity) may be monitored and output by monitor 11 or by other monitors. The pedal rate output by the monitor 11 is monitored by the computer 15 while the computer 15 runs a video game such as a martial arts video game (represented in FIG. 1 by a martial arts character 21 on a computer screen 23 coupled to the computer 15).

The exerciser 19 is shown holding a joystick 25 for controlling the kicking, punching and other movements of the martial arts character 21 on the computer screen 23. The joystick 25 may be directly connected to the computer 15 or coupled to the computer 15 via the monitor 11 as shown in FIG. 1. The joystick/computer connection also may be wireless.

In operation, as the exerciser 19 pedals the recumbent bicycle 13, the monitor 11 measures and outputs (via the output 11') a signal representative of the pedal rate of the exerciser 19. The pedal rate signal output by the monitor 11 is monitored by the computer 15 and is used to control the energy level (e.g., the strength and durability) of the martial arts character 21. Accordingly, the harder the exerciser 19 pedals the bicycle 13, the higher the energy level of the martial arts character 21, and the less likely the martial arts character 21 is to perish from an attack by an opponent martial arts character 27. By exercising harder, the exerciser 19 can therefore score higher or otherwise perform better at the video game.

Many different performance levels of the exerciser 19 can be monitored and used to control a video game character's performance levels (e.g., how the character behaves, reacts, etc.). Table 1 contains a representative list of exerciser performance levels that may be monitored

as the exerciser 19 exercises on the recumbent bicycle 13 or on some other piece of exercise equipment, and possible video character performance levels that can be controlled for each monitored exerciser performance level. Table 1 is not intended as a limitation on monitorable performance levels and is merely exemplary.

TABLE 1

MONITORED EXERCISER PERFORMANCE LEVEL	VIDEO GAME CHARACTER PERFORMANCE LEVEL CONTROLLED
pedaling rate	speed, striking force
stepping rate	speed, striking force
rowing rate	speed, striking force
running rate	speed, striking force
pulse rate	speed, energy level, accuracy
striking force	striking force
swing velocity	swing velocity
distance traveled	game level
time exercised	game level

10

Accordingly, exercise equipment, such as the recumbent bicycle 13, and/or exercise is modified by placing an exercise monitor 11 (e.g., a pulse monitor, a distance meter, a rate monitor, a time monitor, a calorie meter, a strain gauge, an accelerometer and/or any other sensor for measuring the physical activity/performance level of an exerciser) on the equipment and/or the exerciser 19. The exercise monitor 11 outputs a signal representative of the performance level of the exerciser 19 (e.g., pulse rate, distance traveled, time exercised, rate of exercise, etc.) to a video game player (e.g., a computer 15) wirelessly or via a cable. The video game player may be a desk top computer, or preferably comprises a hand-held video game player such as a GameBoy™ (as described with reference to FIG. 2).

25

To stimulate the exerciser 19, the output from the exercise monitor 11 is used to control a parameter within a

video game, such as a video game character 21's lifetime, energy level, striking force, accuracy, speed or the like. Similarly, a video game character 21 may be precluded from reaching a higher level in a game unless the exerciser 19 pedals fast enough, exercises long enough, has a high (or low) enough pulse rate or reaches some other performance level. Multiple performance level measurements of the exerciser 19 may be monitored and used to control multiple performance levels of the video game character 21 (e.g., pulse rate of the exerciser 19 dictates energy level/lifetime of the video game character 21, exercise rate controls the speed of or the striking force of the video game character 21, and duration/distance of exercise controls game level).

Examples of suitable video games include action-adventure games (e.g., military games, dungeon games, murder-mystery games, etc.), martial arts games, sports games (e.g., hiking, swimming, baseball, basketball, tennis, etc.), and other similar games. For instance, during a video baseball game, the force with which a batter strikes a baseball or the speed with which a player runs around a base may be controlled by the speed with which an exerciser pedals, climbs stairs, rows, etc. Similarly, the speed with which a football player rushes or passes, the power with which a boxer punches or a martial artist kicks, or the height to which a basketball player jumps may be similarly controlled. The "energy level" (e.g., a measure of how long a character can survive an event, attack, etc.) or lifetime of a character can be similarly controlled, or controlled by the pulse rate or other cardiovascular indicator of the exerciser. The key is to make the exerciser exercise harder or longer in order to continue the game or do better in the game. Accordingly, the exerciser is stimulated to work harder in exchange for some immediate success or gratification (e.g., doing better in the game). Preferably,

game score/performance will increase with an increasing level of physical fitness (e.g., reduced pulse rate for a given exercise routine, harder workouts, etc.).

If desired, the video game player may analyze the data from the exercise monitor and compile statistics on the exerciser's performance. A database can be maintained for each new exerciser and updated after each exercise session so that progress charts and other statistics can be generated for each exerciser. If desired, other relevant data such as a exerciser's weight, body fat, and the like also may be stored and used to assess progress.

FIG. 2 is a schematic view of an exercise system 30 configured in accordance with a second embodiment of the present invention. With reference to FIG. 2, the exercise system 30 comprises an exercise monitor 31a connected to a recumbent bicycle 33, and a hand-held video game player 35 (such as a GameBoy™ marketed by Nintendo) coupled to an output 31a' of the exercise monitor 31a via a first cable 37a.

The exercise monitor 31a is configured to measure the pedal rate of an exerciser 39 riding the recumbent bicycle 33, and to output an approximately real-time measure of pedal rate via the output 31a'. In addition to the exercise monitor 31a, an exercise monitor 31b is shown connected to the exerciser 39 and to the hand-held video game player 35 via a second cable 37b. The exercise monitor 31b is configured to measure the pulse rate of the exerciser 39. The pedal rate output by the monitor 31a and the pulse rate of the exerciser 39 output by the monitor 31b are monitored by the hand-held video game player 35 while the hand-held video game player 35 runs a video game such as a martial arts video game (represented in FIG. 2 by a martial arts character 41). The exerciser 39 is shown holding the hand-held video game player 35 and can control the kicking, punching and other movements of the martial arts character

conditions within a video game may be output by the video game player and used to increase/decrease the difficulty of exercise, or otherwise affect exercise, if so desired.

Further, old video games may be modified for use with the
5 present invention, or new video games may be developed.

Additionally, while the present invention has been described with reference to a single exerciser, it will be understood that the invention is equally applicable to multiple exerciser situations. For instance, different
10 video game characters within the same video game may be controlled by different exercisers. That is, the performance level(s) of a first exerciser may control the performance level(s) of a first video game character, while the performance level(s) of a second exerciser may control
15 the performance level(s) of a second video game character contained within the same video game as the first video game character. In this manner, the exerciser who exercises harder will have a gaming advantage over the other exerciser. Such multi-exerciser applications may be
20 performed locally (e.g., all exercisers in the same room) or remotely (e.g., at least one exerciser in a different location who communicates remotely, such as over the INTERNET or the WORLD WIDE WEB).

Accordingly, while the present invention has been
25 disclosed in connection with the preferred embodiments thereof, it should be understood that other embodiments may fall within the spirit and scope of the invention, as defined by the following claims.

THE INVENTION CLAIMED IS:

1. A method of exercise comprising:
providing a monitor for determining a level
of exercise performance performed by an exerciser and for
5 outputting a signal representative of the performance level;
using the monitor to measure a level of
exercise performance performed by an exerciser;
outputting from the monitor a signal
representative of the performance level;
10 providing a video game having a character,
the video game inputting and being responsive to the
performance level signal output by the monitor, the video
game using the performance level signal to control a
performance level of the video game character; and
15 controlling a performance level of the video
game character based on the performance level signal output
by the monitor.
2. The method of claim 1 wherein providing a
20 monitor comprises providing a pulse monitor.
3. The method of claim 1 wherein providing a
monitor comprises providing a monitor selected from the
group consisting of a distance monitor, a rate monitor and a
25 time monitor.
4. The method of claim 1 wherein providing a
monitor comprises providing an accelerometer.
- 30 5. The method of claim 1 wherein providing a
video game comprises providing a computer system loaded with
a video game.

6. The method of claim 1 wherein providing a video game comprises providing a hand-held video game system loaded with a video game.

5 7. The method of claim 1 wherein outputting from the monitor comprises outputting from the monitor via a cable a signal representative of the performance level.

10 8. The method of claim 1 wherein outputting from the monitor comprises outputting from the monitor via wireless transmission a signal representative of the performance level.

15 9. The method of claim 1 wherein controlling a performance level of the video game character based on the performance level signal output by the monitor comprises controlling the energy level of the video game character based on the performance level signal output by the monitor.

20 10. The method of claim 1 wherein controlling a performance level of the video game character based on the performance level signal output by the monitor comprises controlling the lifetime of the video game character.

25 11. The method of claim 1 wherein controlling a performance level of the video game character based on the performance level signal output by the monitor comprises controlling the striking force of the video game character.

30 12. The method of claim 1 wherein controlling a performance level of the video game character based on the performance level signal output by the monitor comprises controlling the accuracy of the video game character.

13. The method of claim 1 wherein controlling a performance level of the video game character based on the performance level signal output by the monitor comprises controlling the game level of the video game character.

5

14. The method of claim 1 further comprising:
providing an additional monitor for
monitoring the performance level of an additional exerciser;
outputting from the additional monitor a
10 signal representative of the performance level of the
additional exerciser; and

controlling the performance level of an
additional video game character within the video game based
on the performance level signal output from the additional
15 monitor.

15. An apparatus for use during exercising
comprising:

a monitor for determining a level of exercise
20 performance performed by an exerciser and for outputting a
signal representative of the performance level;

a video game player coupled to the monitor;
and

a video game for use with the video game
25 player, the video game having a character, the video game
configured to input the performance level signal output from
the monitor and to use the performance level signal to
control a performance level of the video game character.

30 16. The apparatus of claim 15 wherein the monitor
comprises a pulse monitor.

17. The apparatus of claim 15 wherein the monitor
comprises a monitor selected from the group consisting of a
35 distance monitor, a rate monitor and a time monitor.

18. The apparatus of claim 15 wherein the monitor comprises an accelerometer.

5 19. The apparatus of claim 15 wherein the video game player comprises a computer system.

20. The apparatus of claim 15 wherein the video game player comprises a hand-held video game player.

10

21. The apparatus of claim 15 further comprising a wireless transmitter for transmitting the performance level signal from the monitor to the video game player.

15 22. The apparatus of claim 15 wherein the video game comprises an action-adventure game.

23. The apparatus of claim 15 wherein the video game comprises a sports game.

20

24. A video game comprising:
a character responsive to the performance level signal output by an exercise monitor, the video game using the performance level signal to control a performance level of the video game character.

25

-1/2

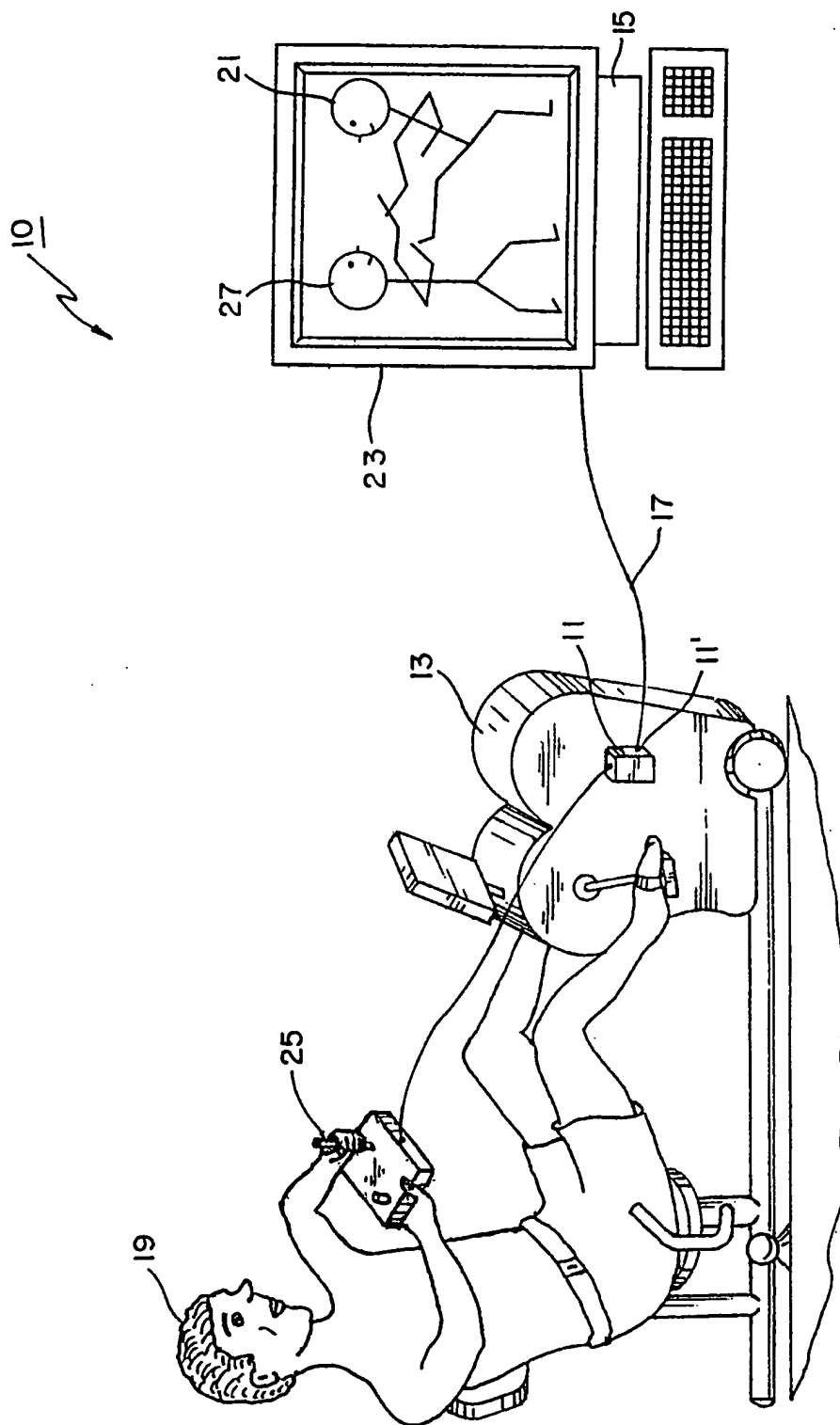


FIG. 1

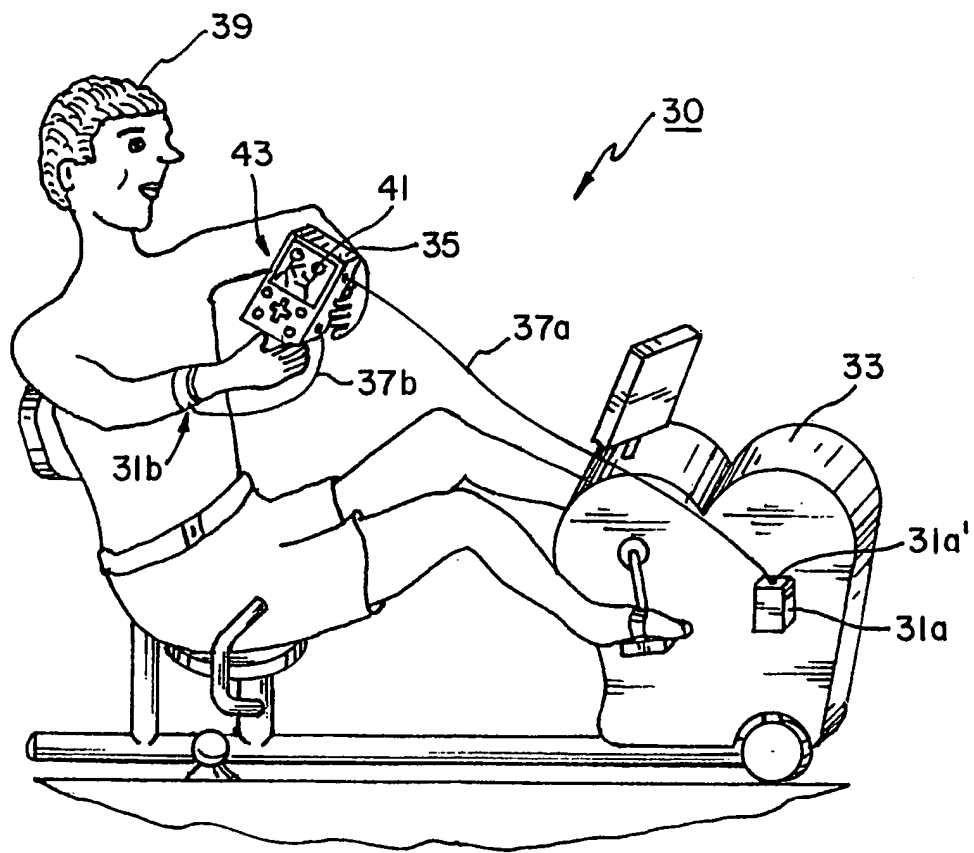


FIG. 2

INTERNATIONAL SEARCH REPORT

International application No.
PCT/US98/13122

A. CLASSIFICATION OF SUBJECT MATTER

IPC(6) : G09B 21/00

US CL : 482/4

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

U.S. : 482/4

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 4,542,897 A (MELTON et al) 24 September 1985, entire document.	1-24
A	US 4,817,938 A (NAKAO et al) 4 April 1989, entire document.	1-24
Y	US 5,001,632 A (HALL-TIPPING) 19 March 1991, entire document.	1-24
Y	US 4,735,410 A (NOBUTA) 05 April 1988, entire document.	1-24

☐ Further documents are listed in the continuation of Box C. ☐ See patent family annex.

* Special categories of cited documents:	"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
"A" document defining the general state of the art which is not considered to be of particular relevance	"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
"B" earlier document published on or after the international filing date	"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art
"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)	"A" document member of the same patent family
"O" document referring to an oral disclosure, use, exhibition or other means	
"P" document published prior to the international filing date but later than the priority date claimed	

Date of the actual completion of the international search

14 AUGUST 1998

Date of mailing of the international search report

17 SEP. 1998

Name and mailing address of the ISA/US
Commissioner of Patents and Trademarks
Box PCT
Washington, D.C. 20231

Facsimile No. (703) 305-3230

Authorized officer

GLENN RICHMAN

Telephone No. (703) 308-3170